

## Overview

KEMET's MS/MD Series of aluminum electrolytic capacitors are designed for intermittent duty only and capable of withstanding the AC voltage applied to the motor during starting. The capacitor construction is comprised of either double anode or O-style (double anode and floating cathode) windings, which are housed in a molded plastic case. KEMET's MD Series is VDE approved to IEC 60252-2 for the defined ratings.

## Applications

KEMET's MS/MD Series is a range of aluminium electrolytic capacitors specifically designed for AC operation which helps to start the motor by providing a leading current to the auxiliary winding. The capacitor is not permanently connected to the winding of the motor and is usually switched off automatically after starting.

## Benefits

- Intermittent AC motor starting
- 6.3 mm double amp tags (quick connect types)
- VDE approved to IEC 60252-2



Click image above for interactive 3D content  
*Open PDF in Adobe Reader for full functionality*

## Part Number System

| 080                                     | MS                                                                   | 12                               | AA                     | M                      | A                        | 1                     | STD            |
|-----------------------------------------|----------------------------------------------------------------------|----------------------------------|------------------------|------------------------|--------------------------|-----------------------|----------------|
| Capacitance Code<br>(µF)                | Rating                                                               | Rated Voltage<br>(VAC)           | Size Code              | Manufacturing<br>Style | Capacitance<br>Tolerance | Terminal Code         | Version        |
| Example:<br>080 = 80 µF<br>120 = 120 µF | MS = Motor start<br>single rating<br>MD = Motor<br>start dual rating | 12 = 120<br>22 = 220<br>26 = 260 | See Dimension<br>Table | M = Molded<br>case     | A = -0% +25%<br>K = ±10% | 1 = Double amp<br>tag | STD = Standard |

## Performance Characteristics

| Item                  | Performance Characteristics                                       |                                                      |
|-----------------------|-------------------------------------------------------------------|------------------------------------------------------|
| Series                | MD (Dual voltage rating)                                          | MS (Single voltage rating)                           |
| Capacitance Range     | 25 – 750 $\mu$ F                                                  | 25 – 750 $\mu$ F                                     |
| Rated Voltage         | 120 – 360 VAC 50 Hz                                               | 120 – 260 VAC 50 Hz                                  |
| Operating Temperature | -20°C to +70°C                                                    | -20°C to +60°C                                       |
| Capacitance Tolerance | $\pm 10\%$ , -0% +25%                                             | $\pm 10\%$ , -0% +25%                                |
| Operational Lifetime  | 500 hours at +70°C, 1.1 $V_R$ (specified duty cycle)              | 500 hours at +60°C, 1.1 $V_R$ (specified duty cycle) |
| Shelf Life            | 2 years                                                           | 2 years                                              |
| Standards             | IEC 60252-2: AC Motor Capacitors - Part 2: Motor Start Capacitors |                                                      |

## VDE Approvals to IEC 60252-2

| Rated Voltage          | 220 V    | 260 V    |
|------------------------|----------|----------|
| Capacitor Type         | MD       | MD       |
| Capacitance ( $\mu$ F) | (Note 1) | (Note 2) |
| 30                     | AA       |          |
| 40                     | AA AB    | AB       |
| 50                     | AA AB    | AB       |
| 60                     | AA AB    | AB       |
| 70                     | AB       | AB       |
| 80                     | AB AC    | AB       |
| 90                     | AC       | AC       |
| 100                    | AC       | AC       |
| 120                    | AC       | AC       |
| 125                    | AC       | AC       |

### Note 1: Duty cycles approved

220 V at SD = 3 & ED = 1.7%

300 V at SD = 1 & ED = 0.1%

### Note 2: Duty cycles approved

260 V at SD = 3 and ED = 1.7% (40 – 125  $\mu$ F)

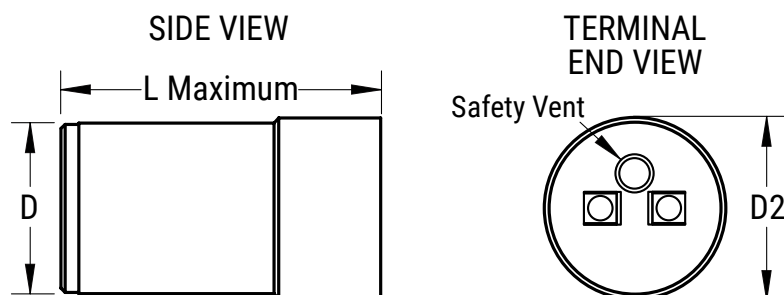
330 v at SD = 1 and ED = 0.55% (40 – 125  $\mu$ F)

360 v at SD = 1 and ED = 0.33% (90 – 125  $\mu$ F)

### General approval notes:

- Valid for both  $\pm 10\%$  and -0+25% tolerance.
- Valid for intermediate capacitance. Values in increments of 1  $\mu$ F between 30  $\mu$ F and 100  $\mu$ F, and in increments of 5  $\mu$ F between 100  $\mu$ F and 125  $\mu$ F.
- Approved duty cycles relate to 50 Hz, as per section 3.1.12.2 of IEC60252-2 operation at 60 Hz is also approved if the relative operation time is reduced by 20%. For example a 50 Hz duty cycle with ED = 1.7% is also approved for 60 Hz with ED = 1.36%.

## Dimensions – Millimeters



| Size Code | Dimensions in mm |      |         |
|-----------|------------------|------|---------|
|           | D                | D2   | L       |
|           | ±0.5             | ±0.5 | Maximum |
| AA        | 38               | 39   | 75      |
| AB        | 38               | 39   | 90      |
| AC        | 38               | 39   | 116     |

### Power Factor

The tangent of the loss angle for motor start capacitors shall not exceed 0.1 and shall be calculated as follows:

$$\tan \delta = \frac{W}{V \times I} = \frac{\text{true watts}}{\text{apparent watts}}$$

### Duty Cycle

The standard rating is 1.67% or 1/60th full time and corresponds to a maximum duty of 20 starts, each of three seconds duration per hour. It is expressed as 3/1.67 (a 3 minute cycle with 1.67% duration during which the capacitor may be energized). If the same capacitor is to be used for a duty cycle of 60 starts per hour the cycle duration will be 1 minute. The operation time per cycle will then have to be reduced to 1.67% of 1 minute (i.e. 1 second). Alternative duty cycles are available on request.

### Presence of Run Capacitor

When the motor is fitted with both starting and run capacitors, consideration should be given to fitting of the appropriate discharge resistor to the starting capacitor. This is to protect the run capacitor from damage through discharge of the starting capacitor.

### Container Form

Cylindrical mouldings, meeting creepage and clearance distances, according to IEC 60335–1 and flammability ratings according to UL94–V1.

## Discharge Resistors

A discharge resistor may be fitted to a motor start capacitor to prevent electrical overstress of the capacitor and/or for safety reasons. In accordance with IEC 60252, the resistor value should be such that it reduces the voltage on the capacitor, from the line voltage to less than 50 V within 60 seconds. The resistor value may be approximated as follows:  $R(\text{k}\Omega) = T/\text{Rated Capacitance } (\mu\text{F})$

| AC Voltage | T      |
|------------|--------|
| 120        | 50,000 |
| 220        | 32,000 |
| 260        | 30,000 |
| 280        | 28,000 |
| 330        | 26,000 |

| Resistor Value (kΩ) | Wattage |
|---------------------|---------|
| 5.6                 | 2W      |
| 15                  | 2W      |
| 33                  | 0.5W    |
| 56                  | 1W      |
| 82                  | 2W      |
| 100                 | 1W      |

## Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Because of customer requirements, there may appear additional markings such as LF = Lead Free or LFW = Lead Free Wires on the label.

**Table 1A – Ratings & Part Number Reference**

| VAC        | Rated Capacitance        |              | Capacitance Tolerance        | Case Size<br>D x L (mm) | Duty Cycle           |                      | Part Number        | Approval   |            |
|------------|--------------------------|--------------|------------------------------|-------------------------|----------------------|----------------------|--------------------|------------|------------|
|            | Minimum (µF)             | Maximum (µF) |                              |                         | 120 V <sub>RMS</sub> | 150 V <sub>RMS</sub> |                    | VDE        | CQC        |
| 120        | 25                       | 325          | -0/+25%                      | 38 x 75                 | 1.67%                |                      | (1)MS12AAMA1STD    | -          | -          |
| 120        | 25                       | 360          | ±10%                         | 38 x 75                 | 1.67%                |                      | (1)MS12AAMK1STD    | -          | -          |
| 120        | 85                       | 460          | -0/+25%                      | 38 x 90                 | 1.67%                |                      | (1)MS12ABMA1STD    | -          | -          |
| 120        | 90                       | 510          | ±10%                         | 38 x 90                 | 1.67%                |                      | (1)MS12ABMK1STD    | -          | -          |
| 120        | 120                      | 670          | -0/+25%                      | 38 x 116                | 1.67%                |                      | (1)MS12ACMA1STD    | -          | -          |
| 120        | 130                      | 750          | ±10%                         | 38 x 116                | 1.67%                |                      | (1)MS12ACMK1STD    | -          | -          |
| 120        | 25                       | 325          | -0/+25%                      | 38 x 75                 | 1.67%                | 0.55%                | (1)MD12AAMA1STD    | -          | x          |
| 120        | 25                       | 360          | ±10%                         | 38 x 75                 | 1.67%                | 0.55%                | (1)MD12AAMK1STD    | -          | x          |
| 120        | 85                       | 460          | -0/+25%                      | 38 x 90                 | 1.67%                | 0.55%                | (1)MD12ABMA1STD    | -          | x          |
| 120        | 90                       | 510          | ±10%                         | 38 x 90                 | 1.67%                | 0.55%                | (1)MD12ABMK1STD    | -          | x          |
| 120        | 120                      | 670          | -0/+25%                      | 38 x 116                | 1.67%                | 0.55%                | (1)MD12ACMA1STD    | -          | x          |
| 120        | 130                      | 750          | ±10%                         | 38 x 116                | 1.67%                | 0.55%                | (1)MD12ACMK1STD    | -          | x          |
| <b>VAC</b> | <b>Rated Capacitance</b> |              | <b>Capacitance Tolerance</b> | <b>Case Size</b>        | <b>Duty Cycle</b>    |                      | <b>Part Number</b> | <b>VDE</b> | <b>CQC</b> |

(1) Insert capacitance code. Valid in increments of 1 µF between 30 µF and 100 µF, and in increments of 5 µF between 100 µF and 125 µF

**Table 1B – Ratings & Part Number Reference**

| VAC        | Rated Capacitance        |              | Capacitance Tolerance        | Case Size<br>D x L (mm) | Duty Cycle           |                      | Part Number        | Approval   |            |
|------------|--------------------------|--------------|------------------------------|-------------------------|----------------------|----------------------|--------------------|------------|------------|
|            | Minimum (µF)             | Maximum (µF) |                              |                         | 220 V <sub>RMS</sub> | 300 V <sub>RMS</sub> |                    | VDE        | CQC        |
| 220        | 30                       | 65           | -0/+25%                      | 38 x 75                 | 1.67%                |                      | (1)MS22AAMA1STD    | -          | -          |
| 220        | 30                       | 70           | ±10%                         | 38 x 75                 | 1.67%                |                      | (1)MS22AAMK1STD    | -          | -          |
| 220        | 40                       | 90           | -0/+25%                      | 38 x 90                 | 1.67%                |                      | (1)MS22ABMA1STD    | -          | -          |
| 220        | 40                       | 100          | ±10%                         | 38 x 90                 | 1.67%                |                      | (1)MS22ABMK1STD    | -          | -          |
| 220        | 55                       | 140          | -0/+25%                      | 38 x 116                | 1.67%                |                      | (1)MS22ACMA1STD    | -          | -          |
| 220        | 65                       | 150          | ±10%                         | 38 x 116                | 1.67%                |                      | (1)MS22ACMK1STD    | -          | -          |
| 220        | 30                       | 60           | -0/+25%                      | 38 x 75                 | 1.67%                | 0.10%                | (1)MD22AAMA1STD    | x          | x          |
| 220        | 30                       | 60           | ±10%                         | 38 x 75                 | 1.67%                | 0.10%                | (1)MD22AAMK1STD    | x          | x          |
| 220        | 40                       | 80           | -0/+25%                      | 38 x 90                 | 1.67%                | 0.10%                | (1)MD22ABMA1STD    | x          | x          |
| 220        | 40                       | 80           | ±10%                         | 38 x 90                 | 1.67%                | 0.10%                | (1)MD22ABMK1STD    | x          | x          |
| 220        | 80                       | 125          | -0/+25%                      | 38 x 116                | 1.67%                | 0.10%                | (1)MD22ACMA1STD    | x          | x          |
| 220        | 80                       | 125          | ±10%                         | 38 x 116                | 1.67%                | 0.10%                | (1)MD22ACMK1STD    | x          | x          |
| <b>VAC</b> | <b>Rated Capacitance</b> |              | <b>Capacitance Tolerance</b> | <b>Case Size</b>        | <b>Duty Cycle</b>    |                      | <b>Part Number</b> | <b>VDE</b> | <b>CQC</b> |

(1) Insert capacitance code. Valid in increments of 1 µF between 30 µF and 100 µF, and in increments of 5 µF between 100 µF and 125 µF

**Table 1C – Ratings & Part Number Reference**

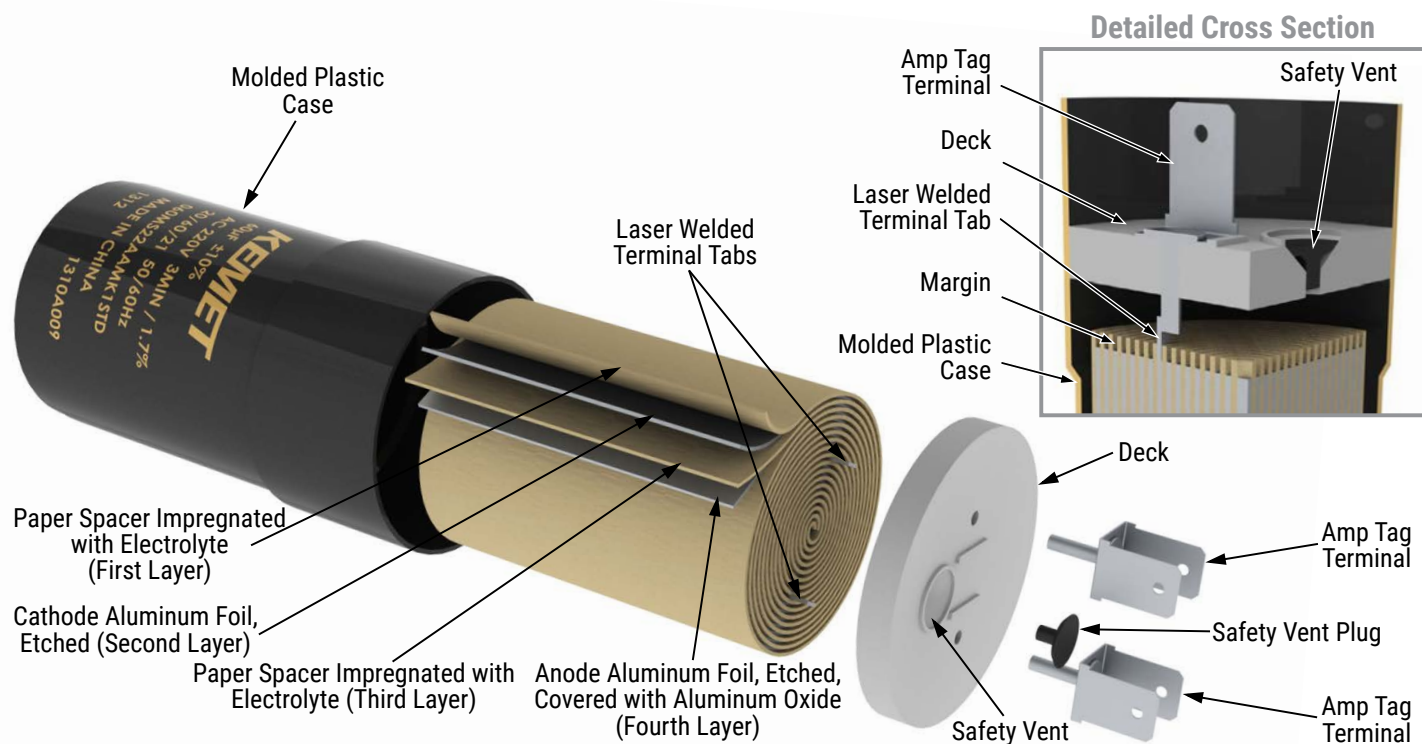
| VAC        | Rated Capacitance        |              | Capacitance Tolerance        | Case Size<br>D x L (mm) | Duty Cycle           |                      |                      | Part Number        | Approval   |            |
|------------|--------------------------|--------------|------------------------------|-------------------------|----------------------|----------------------|----------------------|--------------------|------------|------------|
|            | Minimum (µF)             | Maximum (µF) |                              |                         | 260 V <sub>RMS</sub> | 330 V <sub>RMS</sub> | 360 V <sub>RMS</sub> |                    | VDE        | CQC        |
| 260        | 25                       | 55           | -0/+25%                      | 38 x 75                 | 1.67%                |                      |                      | (1)MS26AAMA1STD    | -          | -          |
| 260        | 25                       | 60           | ±10%                         | 38 x 75                 | 1.67%                |                      |                      | (1)MS26AAMK1STD    | -          | -          |
| 260        | 35                       | 75           | -0/+25%                      | 38 x 90                 | 1.67%                |                      |                      | (1)MS26ABMA1STD    | -          | -          |
| 260        | 35                       | 85           | ±10%                         | 38 x 90                 | 1.67%                |                      |                      | (1)MS26ABMK1STD    | -          | -          |
| 260        | 50                       | 110          | -0/+25%                      | 38 x 116                | 1.67%                |                      |                      | (1)MS26ACMA1STD    | -          | -          |
| 260        | 55                       | 125          | ±10%                         | 38 x 116                | 1.67%                |                      |                      | (1)MS26ACMK1STD    | -          | -          |
| 260        | 25                       | 50           | -0/+25%                      | 38 x 75                 | 1.67%                | 0.55%                |                      | (1)MD26AAMA1STD    | x          | x          |
| 260        | 25                       | 55           | ±10%                         | 38 x 75                 | 1.67%                | 0.55%                |                      | (1)MD26AAMK1STD    | x          | x          |
| 260        | 40                       | 80           | -0/+25%                      | 38 x 90                 | 1.67%                | 0.55%                |                      | (1)MD26ABMA1STD    | x          | x          |
| 260        | 40                       | 80           | ±10%                         | 38 x 90                 | 1.67%                | 0.55%                |                      | (1)MD26ABMK1STD    | x          | x          |
| 260        | 90                       | 125          | -0/+25%                      | 38 x 116                | 1.67%                | 0.55%                | 0.33%                | (1)MD26ACMA1STD    | x          | x          |
| 260        | 90                       | 125          | ±10%                         | 38 x 116                | 1.67%                | 0.55%                | 0.33%                | (1)MD26ACMK1STD    | x          | x          |
| <b>VAC</b> | <b>Rated Capacitance</b> |              | <b>Capacitance Tolerance</b> | <b>Case Size</b>        | <b>Duty Cycle</b>    |                      |                      | <b>Part Number</b> | <b>VDE</b> | <b>CQC</b> |

(1) Insert capacitance code. Valid in increments of 1 µF between 30 µF and 100 µF, and in increments of 5 µF between 100 µF and 125 µF

## Marking



## Construction



## KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit [www.kemet.com/sales](http://www.kemet.com/sales).

---

### Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

*KEMET is a registered trademark of KEMET Electronics Corporation.*

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)